

CHAPTER 5

PERSPECTIVE PROJECTIONS

Overview

Introduction

The principal device for spatial representation that creates the illusionistic third dimension on two-dimensional surfaces has been perspective. Refinements during the Renaissance and the subsequent development of photography in the nineteenth century reenforced perspective as the natural and standard method of representation. By the end of the nineteenth century, artists exposed to art from non-western cultures challenged the confinements of absolute perspective to develop abstract and expressive representations. An understanding of perspective helps you create more realistic imagery. Before you can coherently create abstract art, you should understand the principles of perspective. Study the works of Albrecht Dürer for examples of superb draftsmanship and perspective representation. In contrast, study the work of Marcel Duchamp, whose expressive distortions of perspective and perception led into the Futurism movement in 1909.

Objectives

The material in this chapter enables you to do the following:

- Distinguish between parallel and perspective projection.
 - Define one-point perspective.
 - Define two-point perspective.
 - Define three-point perspective.
 - Recognize the differences in three-point perspective and isometric projection.
 - Evaluate key features in drawings and check for technical accuracy and completeness.
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Overview, Continued

Acronyms

The following table contains a list of acronyms that you must know to understand the material in this chapter.

Acronym	Meaning
CL	Centerline
CV	Center of Vision
GL	Ground Line
HL	Horizon Line
SP	Station Point
PP	Picture Plane
VP	Vanishing Point

In this chapter

This chapter covers the following topics:

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Perspective

Introduction

Two types of projections or methods of realistically representing objects on a page are parallel projection and perspective or central projection. Parallel projection is used for technical drawings and blueprints and is covered in the next chapter. Perspective or central projection is used in creative art or technical sketching but seldom in technical drawing.

Perspective or central projection

Perspective projection, sometimes called *central projection*, is the method by which artists realistically portray three-dimensional objects on a two-dimensional plane. Perspective or central projection is, in theory, where objects are drawn on a page by extending lines of sight called *projectors* from the eye of the observer through lines and points on the object to the plane of projection. The resultant drawing is always called a central projection because the lines of sight or projectors meet at a central point -the eye of the observer. The projected view of the object may vary considerably in size according to the relative positions of the objects and the plane of projection. Varying from natural perspective distorts images into abstract or expressive representation. Perspective alone will not effectively create the illusion of three dimensions without tone or shading. In photography, perspective dominates. Although scene replication is almost exact, photography has crucial limitations regarding field of view. The human eye sees wide and far but the photographic lens has field of view limitations that even with corrective lenses results in distortion. Corrective wide-angle lenses typically result in distortion called *barrel distortion*, where the lines parallel to the sides of the picture frame bow inward at the center.

Figure 5-1 illustrates the effect of barrel distortion.

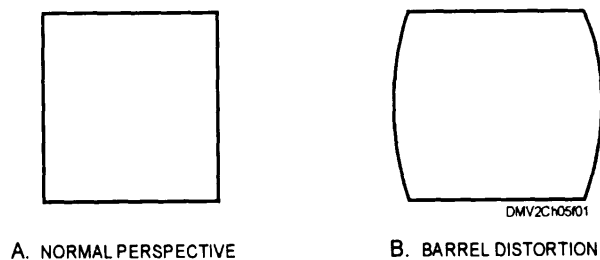


Figure 5-1.—Differences in a cube exhibiting:
A. Normal perspective, and B. Barrell distortion.

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Perspective, Continued

General principles of perspective

Perspective involves four main elements; the observer's eye, the object being viewed, the plane of projection, and the projectors from the observer's eye to all points on the object. Other terms you should become familiar with are plan and elevation, picture plane, vanishing point, horizon line, ground line, and visual rays.

THE OBSERVER'S EYE: The observer's eye, also known as the *station point* (SP), represents the location of the eyes of the observer. You should direct the centerline (CL) of the cone of visual rays toward the center of interest. For small or medium-sized objects, place the station point slightly above the object. For large objects, place the station point at eye level or approximately 5 feet 6 inches above ground. The station point is the most influential element of perspective drawing because it affects location, viewpoint, and perspective.

Figure 5-2 shows the centerline of a cone of visual rays.

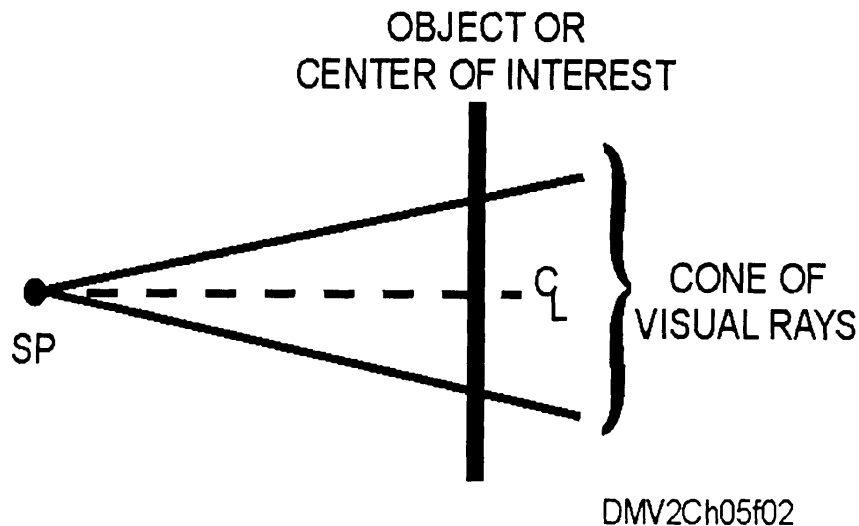


Figure 5-2.—The cone of visual rays.

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Perspective, Continued

General principles of perspective (Continued)

THE OBJECT BEING VIEWED: The object being viewed is the object that attracts the observer's eye. With rare exceptions, the object being viewed appears behind the plane of projection. An object placed above the horizon line appears as if seen from below. An object placed below the horizon line appears as if seen from above.

Figure 5-3 shows a cube on, above, and below the horizon line as viewed from the same station point.

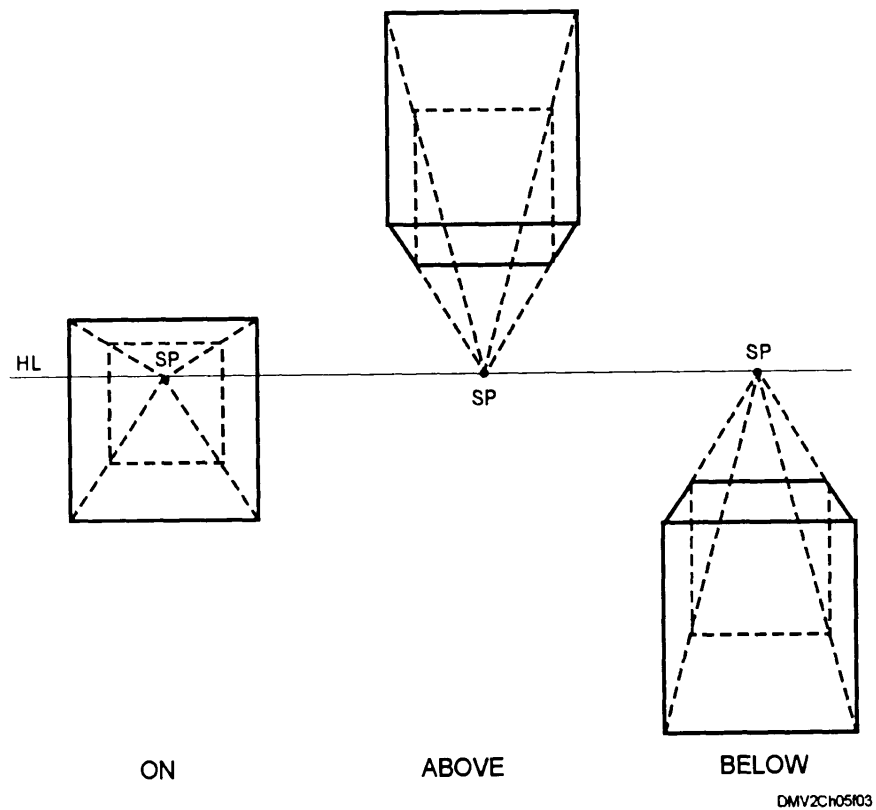


Figure 5-3.—Perspective changes as position relative to the horizon line changes.

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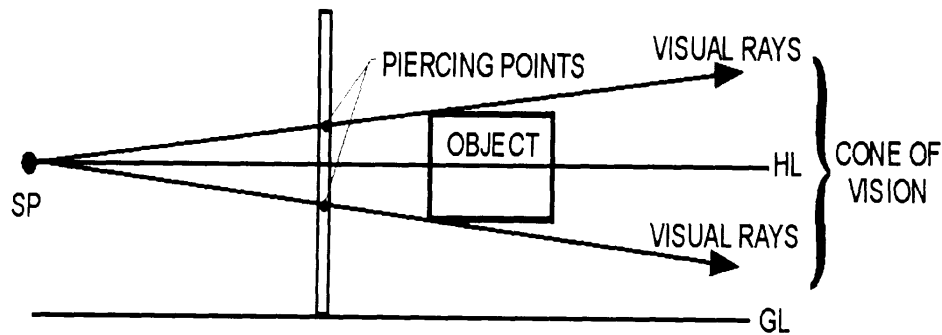
Perspective, Continued

General principles of perspective (Continued)

THE PLANE OF PROJECTION: The plane of projection is the imaginary plane normally located between the observer and the object being drawn. The location of the plane of projection determines the size of the object on the picture plane. The points at which projectors intersect the picture plane are called *piercing points*. A collective of all of the piercing points produces perspective and are called *perspectives*.

THE PROJECTORS FROM THE OBSERVER'S EYE TO ALL POINTS ON THE OBJECT: The projectors are imaginary lines from the observer's eye to the object being drawn. Projectors are also called *visual rays*. The range of view of visual rays is called the *cone of vision*.

Figure 5-4 shows piercing points and visual rays.



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Figure 5-4.—Piercing points, visual rays, and cone of vision.

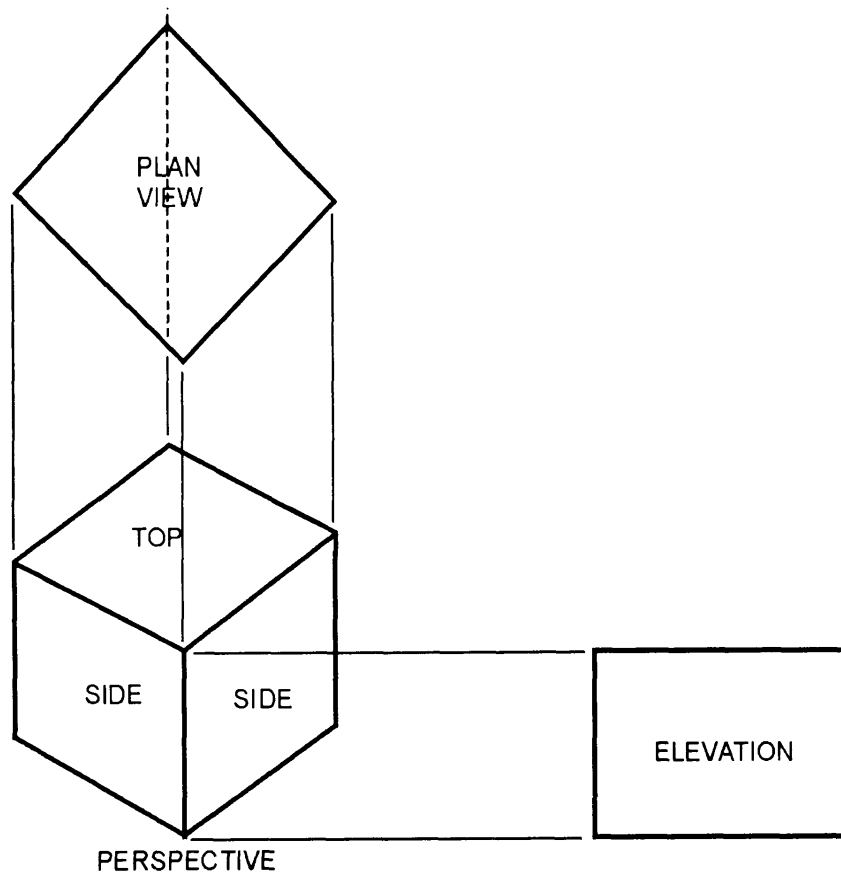
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Perspective, Continued

General principles of perspective (Continued)

PLAN AND ELEVATION: Top views in perspective drawings are called *plan views* and the front and side views are called *front elevation* and *side elevation*, respectively.

Figure 5-5 shows a plane view and elevation.



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Figure 5-5.—A plan view and elevation.

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Perspective, Continued

General principles of perspective (Continued)

PICTURE PLANE (PP): The picture plane (PP) is the imaginary vertical plane placed between the eye of the observer and the object being drawn. Although the usual position of the picture plane is between the station point and the object, you may also place the PP behind the object or behind the SP as it is in photography when the image strikes the film or focal plane. Moving the picture plane alters perspective or scale but not proportion. In general, the farther the plane is from the object, the smaller the perspective. A picture plane, plane of projection, and drawing surface may be the same.

Figure 5-6 shows possible locations for the picture plane.

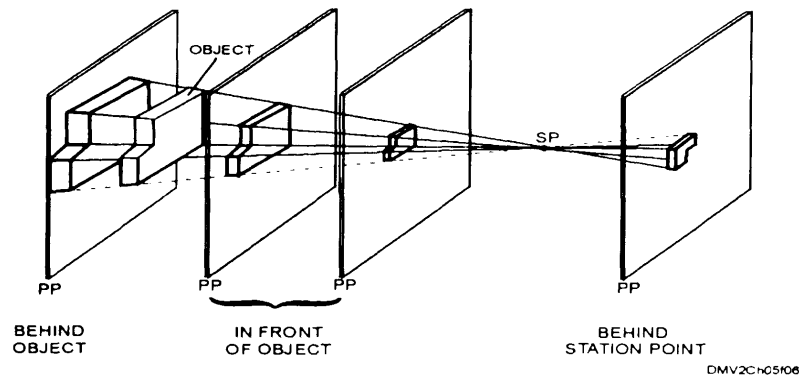


Figure 5-6.—Location of the picture plane.

VANISHING POINT (VP): Vanishing points (VP) are where parallel horizontal lines appear to converge. Vanishing points are also known as the *center of vision (CV)*.

Figure 5-7 show how horizontal lines in perspective seem to converge into vanishing points.

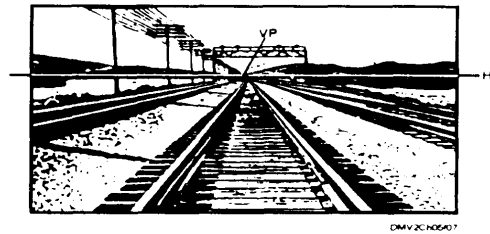


Figure 5-7.—Horizontal lines in perspective.

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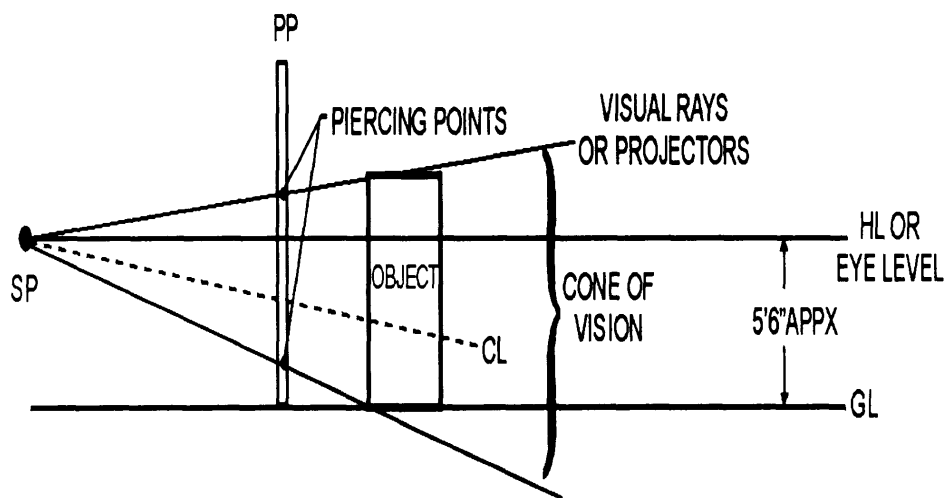
Perspective, Continued

General principles of perspective (Continued)

HORIZON LINE (HL): The horizon line is the position of the horizon that may or may not be visible on the picture plane depending on your angle of sight. The horizon line is also known as the eye level. Eye level is typically defined as 5 feet 6 inches above the ground.

GROUND LINE (GL): The ground line represents the edge of the ground plane on which the object rests. The ground line defines the lower limits of your drawing.

Figure 5-8 illustrates component parts of the principles of perspective.



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Figure 5-8.—Component parts in perspective.

Linear Perspective

Introduction

Linear perspective, aerial perspective, and shading are the prime methods for conveying a sense of natural space and three-dimensional form. In linear perspective, converging lines express the recession of parallel forms into space away from the observer. Linear perspective produces images that are accurate representations of real objects recognized and identified by artists and laymen alike.

Linear perspective

Linear perspective is a geometric system for depicting objects, planes, and volumes in space on a two-dimensional field. This precise mathematical interpretation is based on the location of the observer in reference to the objects drawn. This system uses size, position, and converging parallels to create a unified spatial order. Certain characteristics common to images drawn in linear perspective are vanishing points, horizon lines, ground lines, and picture planes. Linear perspective is the type of perspective most commonly used by draftsmen and artists.

Figure 5-9 is an example of linear perspective.

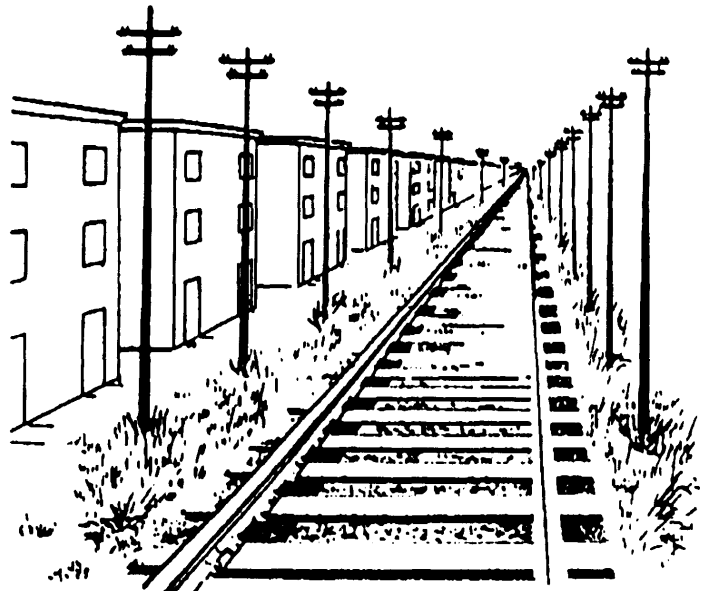


Figure 5-9.—Linear perspective.

Reverse Perspective

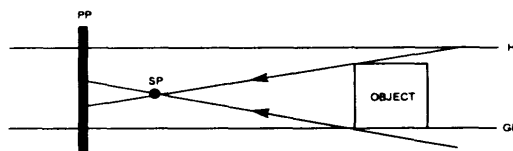
Introduction

Asian and eastern cultures approach perspective from an opposite philosophy. The traditional oriental artist believed that parallel lines converged as the lines approached the spectator. This belief involves the observer as an active participant in the image rather than a passive bystander. This philosophy or technique is known as *reverse perspective*. For further study in reverse perspective, study works before 1729, particularly those paintings executed by Japanese artist Kiyonobu, founder of the Torii school.

Reverse perspective

Reverse perspective is when parallel horizontal lines converge as they approach the observer. This technique requires the location of the picture plane behind the station point creating the illusion of enclosing or limited space that actively involves the observer in the image area. The observer sees the image as large, flat (in perspective), and detailed (without the affects of aerial perspective). The spatial panorama presented to the observer is rarely noticeably enclosed by an implied picture plane.

Figure 5-10 illustrates the location of the picture plane and a resultant perspective.



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Figure 5-10.—Reverse perspective.

Aerial Perspective

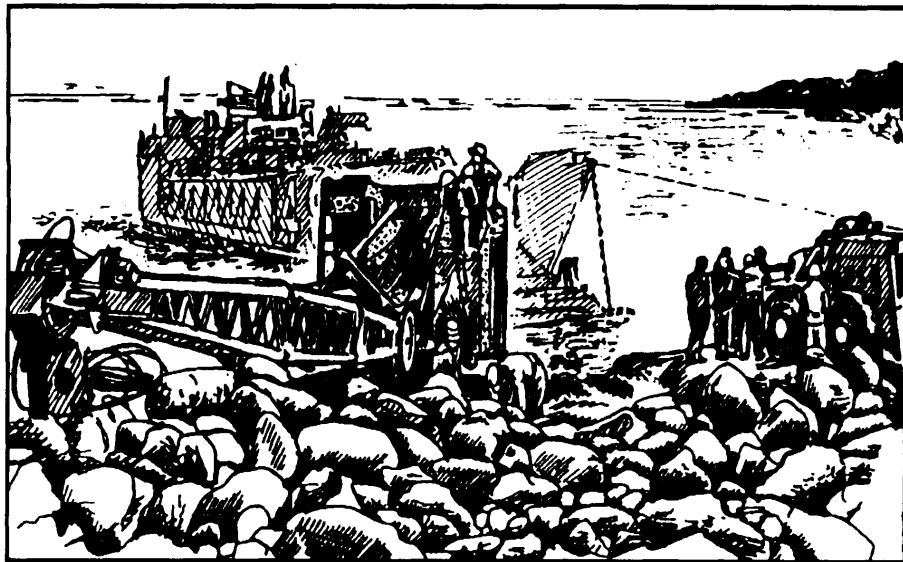
Introduction

Aerial perspective creates the illusion of distance. Aerial perspective is sometimes referred to as *atmospheric perspective* because it attempts to replicate the natural muting effect of the atmosphere as distance increases between the station point, object, and horizon line.

Aerial perspective

Aerial perspective creates the illusion of distance in an image by lightening values, softening contours, reducing value contrasts, and neutralizing colors in objects approaching the horizon line. Details that are less crisp and colors that are less intense imply distance. Aerial perspective works in conjunction with linear perspective contributing to the overall success in portraying perspective within a scene.

Figure 5-11 illustrates how the principles of aerial perspective creates distance.



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Figure 5-11.—Aerial perspective.

One-Point Perspective

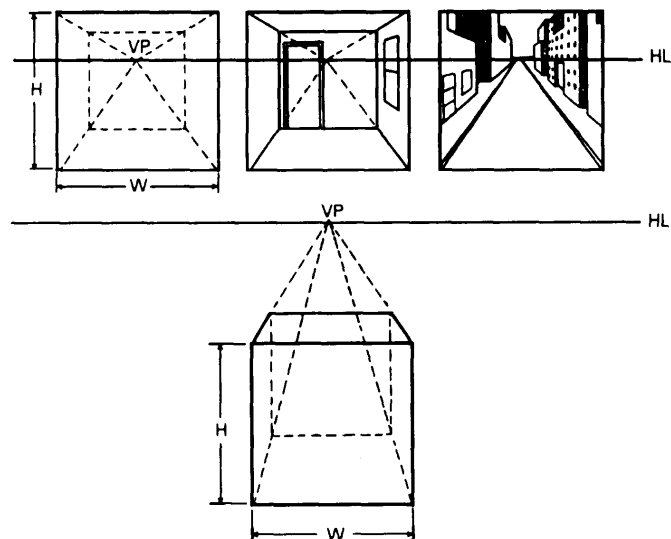
Introduction

One-point perspective is when an object is directly in front of an observer and not seen at an angle. The principal surface of an object is parallel to the picture plane and to the station point. The remaining structure of the object is perpendicular to the picture plane. For this reason, one-point perspective is also called *parallel perspective*. One of the most common uses of one-point perspective is in interior architectural illustrations. For interesting study on one-point perspective, study tromp-l'œil drawings and paintings.

One-point or parallel perspective

One-point or parallel perspective places two principal edges (height and width) of one surface of an object parallel to the picture plane. Height and width have no vanishing point and appear in true length since they are parallel to the picture plane. Only the depth dimension must be put in perspective, and this requires one vanishing point. The station point is in front and parallel to the object and the vanishing point is directly behind. To find the third dimension representing depth, project visual rays from the station point to the vanishing point. Changing the location of the vanishing point or raising and lowering the eye level affect perspective.

Figure 5-12 shows one-point perspective with vanishing points behind and above the cube or object.



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Figure 5-12.—One-point perspective.

Two-Point Perspective

Introduction

Two-point perspective is when objects are located at an angle to the picture plane but with vertical edges parallel to the picture plane. Two vanishing points are required to project the remaining dimensions. Two-point perspective is also called *angular perspective* because of the angular position of the object in relation to the picture plane. Two-point perspective is the most commonly used type of perspective in drawing and illustration.

Two-point or angular perspective

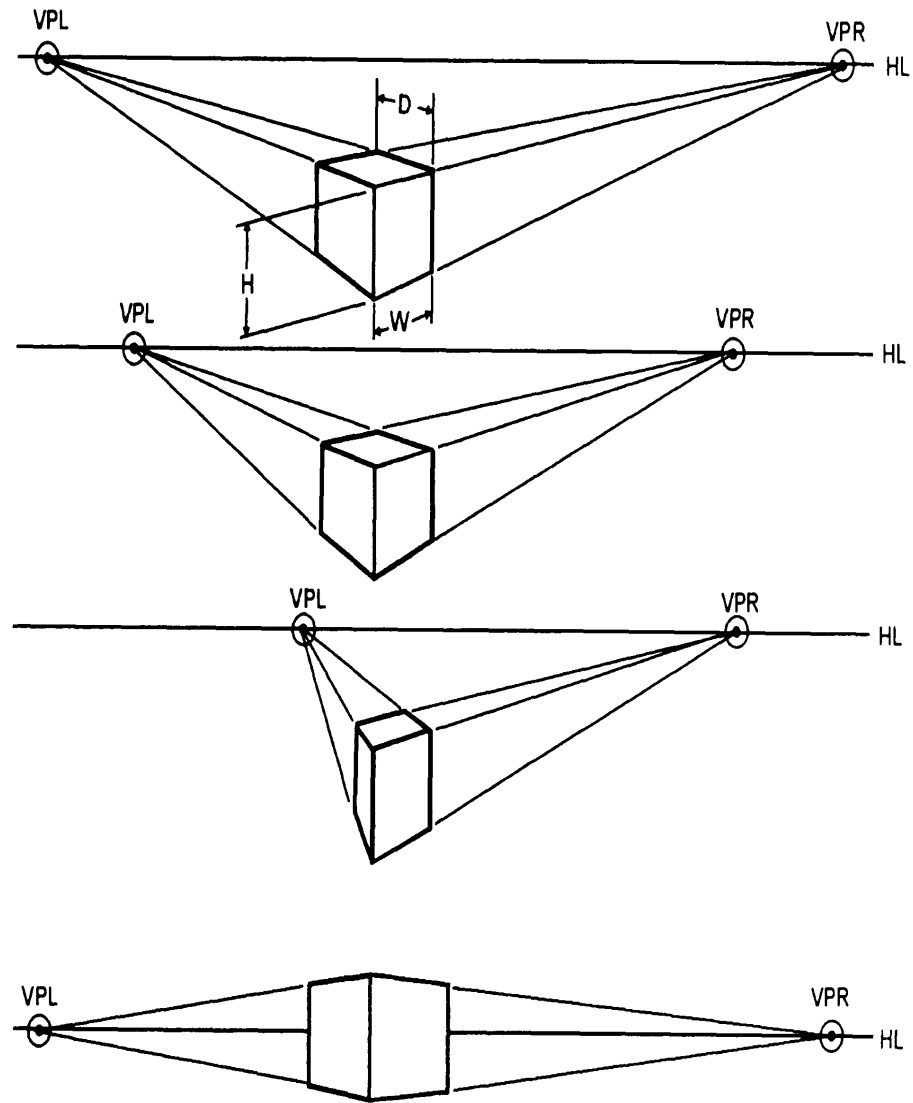
In two-point or angular perspective, an object is placed at an angle to the picture plane but with one set of vertical edges parallel to the picture plane. Place the object so that the angles created by the surface of the object to the picture plane are unequal. For convenience in drawing, the angles you select should equate to angles that a common 45° or 30/60/90° triangle or combination of the two triangles can easily replicate. The vertical parallel edge (height) appears in true length and does not require vanishing points. You may make direct measurements from this parallel vertical edge. You must use perspective to draw the remaining profile of the object. This will require two vanishing points (width and depth). The station point is located in front of and parallel to the picture plane. The object is at an angle to the picture plane and vanishing points are usually located to the left and right of the object. Visual rays projected from the station point to the vanishing point intersect the object at piercing points to form perspective. If available, you may use the plan and elevation of multiview drawings in the construction of the perspective drawings.

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Two-Point Perspective, Continued

Two-point or
angular
perspective
(Continued)

Figure 5-13 shows the typical set up for two-point perspective.



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Figure 5-13.—Two-point perspective.

Three-Point Perspective

Introduction

Three-point perspective is when no edge of the object is parallel to the picture plane and all three dimensions (height, width, and depth) require vanishing points. Three-point perspective is also known as *oblique perspective*. You need a more sophisticated sense of perspective to successfully create illustrations in three-point perspective.

Three-point or oblique perspective

In three-point or oblique perspective, the object is placed so that none of the principal edges is parallel to the picture plane. All three edges require separate vanishing points to determine height, width, and depth. The station point is parallel to the picture plane and the cone of visual rays is perpendicular to the picture plane. The decision on the placement of the vanishing points is arbitrary and based purely on aesthetics. Here are two general rules to follow in placing vanishing points in three-point perspective: (1) separate vanishing points to make small objects look better and (2) place vanishing points closer together to emphasize the expanse or large size objects.

Figure 5-14 shows an object rendered in three-point perspective.

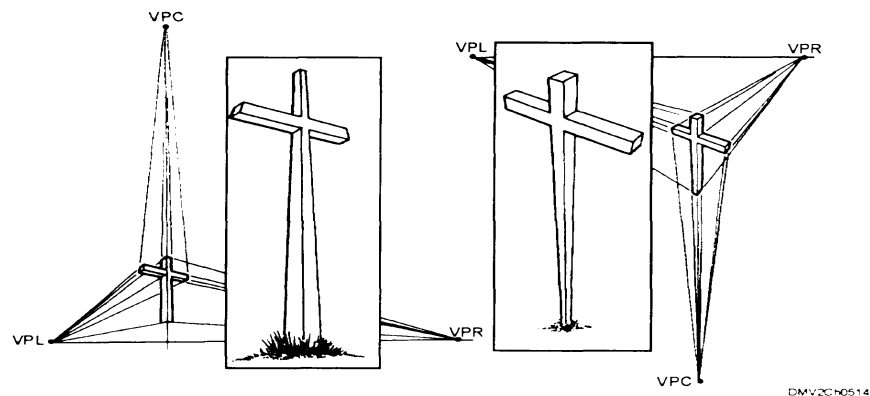


Figure 5-14.—Three-point perspective.

Perspective Practices

Introduction

As ethereal as perspective drawing may seem, there are some standard practices that help you construct believable perspective drawings.

Mechanical construction of perspective drawings

Two basic systems are used in the mechanical construction of accurate perspective drawings: the plan-view method and the measuring-line method. Many illustrators use a combination of both systems when using mechanical means to produce drawings in perspective.

Plan-view method in one-point perspective

The plan-view method of constructing one-point perspective drawings requires that you have copies of orthographic projection drawings drawn to scale.

To construct perspective drawings from a plan view, use this table:

Step	Action
1	Establish an arbitrary horizon line (HL) depending on the eye level you wish to portray (figure 5-15, view A).
2	Locate the picture plane (PP) so that it does not interfere with the drawing. Remember that the picture plane may be the same as the horizon line.
3	Draw the plan view. You may draw the plan view above or below the picture plane, but it is easier to draw it resting on top of the picture plane.
4	Draw the ground line (GL) in an arbitrary location below and parallel to the picture plane (figure 5-15, view B).
5	Locate the station point (SP) not less than twice the width of the object (obtained from the plan view) and directly in front of or to one side of the plan view. You may also place the SP two or three times the object's greatest length from the nearest point of the plan view but if placed any closer, distortion of the perspective will result.
6	Project the width of the plan view to the ground line.

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Perspective Practices, Continued

**Plan-view
method in one-
point
perspective
(Continued)**

Step	Action
7	Draw the front view of the object on the ground line. If the front view of the object is touching the picture plane, the front view is true in size. If the plan view is behind or in front of the picture plane, the front view of the object is smaller or larger, respectively (figure 5-15, view C).
8	Project a vertical line from the station point to the horizon line to locate the vanishing point (VP).
9	From the corners of the front view (D, E, G, and F), draw visual rays to the vanishing point.
10	line from point A of the plan view to the station point. This line intersects the picture plane at point H. Draw a perpendicular line from point H to intersect the visual rays (points J and K). This accurately locates the back corners and defines the depth of the object (figure 5-15, view D).
11	Darken the object outlines.

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Perspective Practices, Continued

Plan-view method in one- point perspective (Continued)

Figure 5-15 shows a simple one-point perspective of a cube constructed from a plan view.

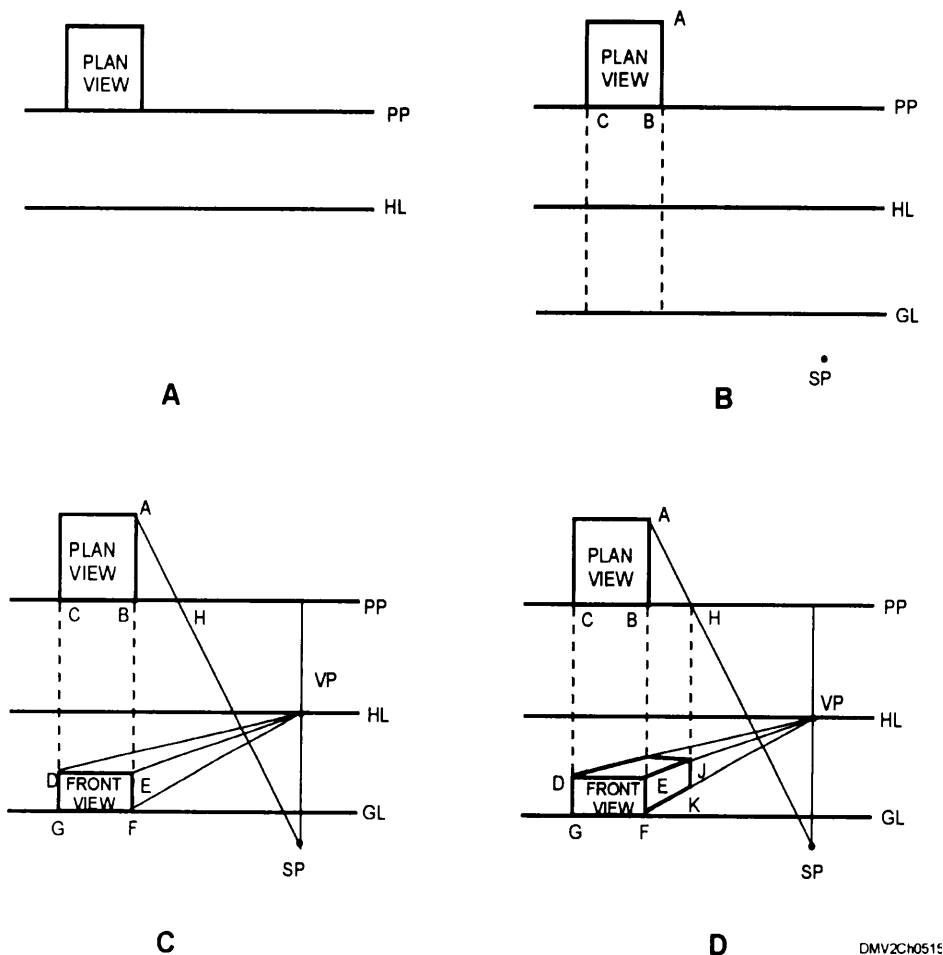


Figure 5-15.—The plan-view method of one-point perspective.

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Perspective Practices, Continued

Plan view method in two- point perspective

Two-point or angular perspective is the most common type of perspective drawing.

To construct two-point perspective drawings from a plan view, use this table:

Step	Action
1	Draw the horizon line and ground line (figure 5-16, view A).
2	Draw the picture plane line near the top of your paper so that it is out of the way of the perspective drawing.
3	Draw an arbitrary perpendicular line from the corner where the object touches the picture plane (point O) to locate the station point. Place the station point at a distance not less than twice the total width of the object from point O (figure 5-16, view B).
4	Draw the plan view of the object.
5	Draw a line from the station point parallel to the side of the plan view where it intersects the picture plane (OB).
6	Draw a perpendicular line from 1 to the horizon line to locate the right vanishing point (VPR).
7	Draw a line from the station point parallel to the side (OA) of the plan view to where it intersects the picture plane at (2).
8	Draw a perpendicular line from 2 to the horizon line to locate the left vanishing point (VPL). The angle formed by the lines drawn from the station point to points 1 and 2 is equal to 90° .
9	Draw lines from the corners of the plan view (O, A, B, C) to the station point (figure 5-16, view C).
10	Project perpendicular lines from where these lines intersect the picture plane downward to the ground line.
11	From point Y, the intersection of line OSP, and the ground line, extend visual rays to both vanishing points to define the lower base of the object.

Continued on next page

Perspective Practices, Continued

Plan-view method in two-point perspective (Continued)

Step	Action
12	Taking dimensions from the orthographic views (the edge of the object that touches the picture plane), measure the vertical distance along line OY (figure 5-16, view D).
13	Project these points to the vanishing points.
14	The edges and comers of the object outline are defined where the visual rays intersect the perpendicular projectors.
15	Darken the object outlines.

Figure 5-16 shows the mechanical plan view method of constructing two-point perspectives.

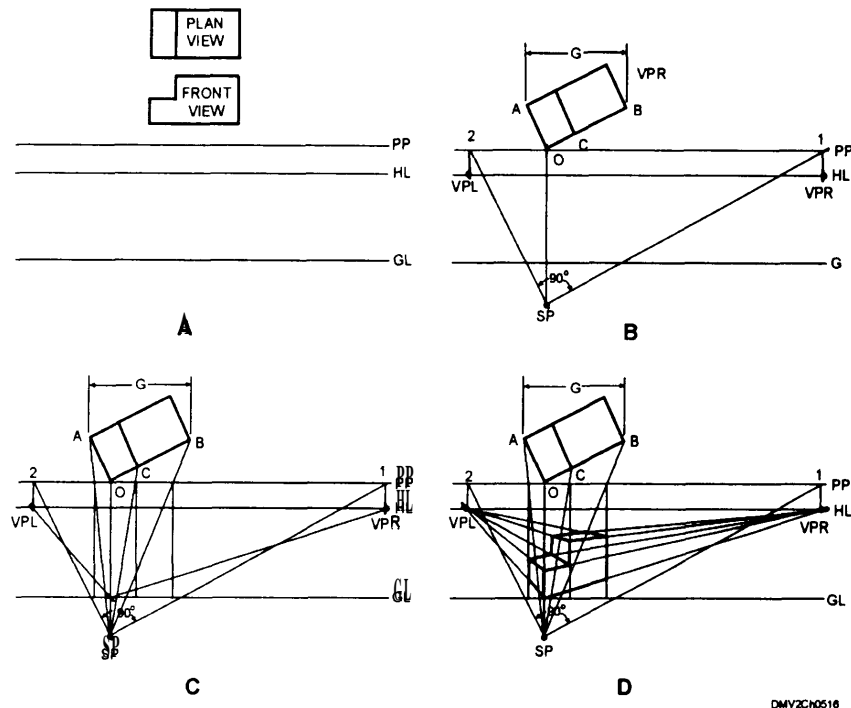


Figure 5-16.—The plan-view method of two-point perspective.

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Perspective Practices, Continued

Measuring-line method of perspective projection

The measuring-line method of constructing perspective drawings is used less than the plan view method. Use the measuring-line method of constructing perspective drawings when you do not have scaled orthographic drawings of the object. The measuring-line method works best when used in simple constructions of linear objects because of the amount of mathematical computations required to determine line lengths.

To construct perspective drawings using the line-measurement method, use this table:

Step	Action
1	Draw a horizon line and ground line.
2	Arbitrarily place two well-separated vanishing points, one on either side of the object (VPL and VPR).
3	Select a surface (A) and place it parallel (one-point perspective) or at an angle (two-point perspective) to the picture plane.
4	Extend visual rays from the station point to the vanishing points.
5	Measure height along the dimension that is parallel to the picture plane. This measurement will appear in true length.
6	Measure the dimensions of width and length against the GL. Draw perpendicular lines to intersect the receding lines leading to the vanishing points.
7	Darken all object outlines.

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Perspective Practices, Continued

Measuring-line
method of
perspective
projection
(Continued)

Figure 5-17 shows the line-measurement method of constructing perspective.

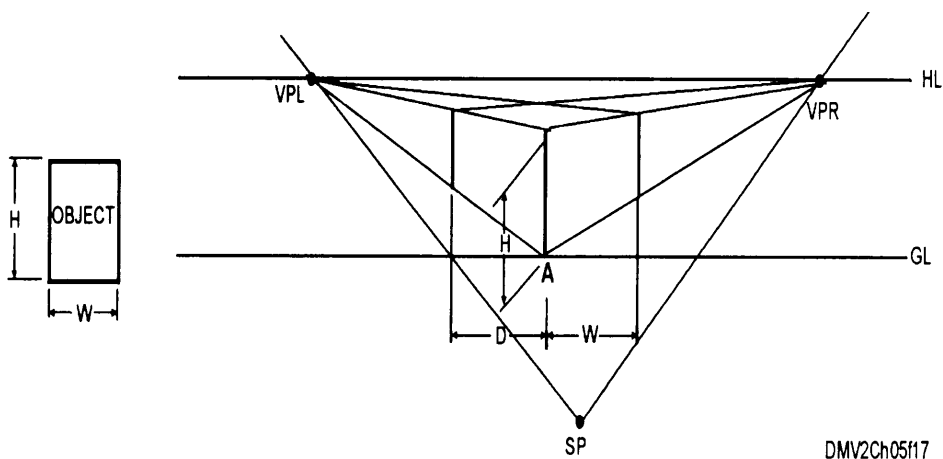


Figure 5-17.—The line-measurement method of constructing perspective drawings.

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Perspective Practices, Continued

Distortion

Distorted images appear when the object being drawn is too high or too low below the horizon line. Distortion also occurs when the station point is too close to the object. Moving the station point is the easiest and most used method for correcting distortion.

Figure 5-18 illustrates distortion caused by incorrect object placement.

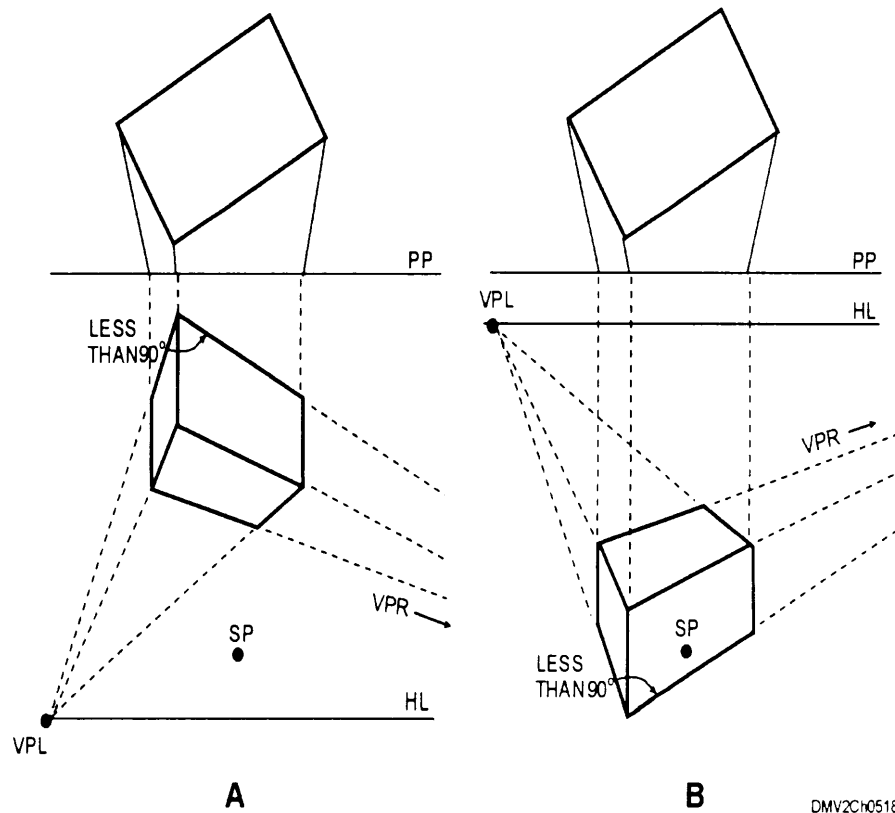


Figure 5-18.—Distortion caused by: A. Object placement too high, and B. Object placement too low in relation to the horizon line.

Measurements in perspective

All lines in the picture plane are shown in true length. All lines behind the picture plane are foreshortened. All lines and shapes parallel to the picture plane are shown in true size and shape.

Continued on next page

Perspective Practices, Continued

Inclined lines and planes

Lines and planes inclined toward or away from the picture plane have vanishing points similar to horizontal vanishing points. When constructing perspective drawings from plan and elevation views, locating the vanishing points for the inclined lines involves further preliminary projection.

To find the vanishing points of inclined lines in two-point perspective, use this table:

Step	Action
1	Place the picture plane, horizon line, and ground line as done previously in the mechanical construction of perspective drawings.
2	Extend the vertical lines AB and CD through the horizontal vanishing points (VPR and VPL). The vanishing points for inclined lines and surfaces will fall along these lines. Note that when you view an object, all inclined planes should project to the right. which means that all their vanishing points fall to the right of vertical line CD (figure 5-19, view A).
3	Using the line from the station point to where it intersects the picture plane (SPY), construct angle a equal to the angle made by the inclined plane 1234 and the picture plane in the elevation view. Extend this line beyond line CD (figure 5-19, view B).
4	Construct a perpendicular to this line intersecting CD at Y.
5	Using a compass or dividers, lay off this perpendicular distance on CD from the right vanishing point. This is VPR1 for the inclined plane 1234.
6	Proceed with this method for the remaining inclined planes to obtain VPR2 and VPR3 (figure 5-19, view C).
7	Finish and darken the object outline.

You can find the perspectives of inclined lines without finding the vanishing points by finding the perspectives of the end points and joining them. You can determine the perspective of any point by finding the perspectives of any two lines intersecting at the point.

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Perspective Practices, Continued

Inclined lines and planes (Continued)

Figure 5-19 shows how to draw inclined lines and planes in two-point perspective.

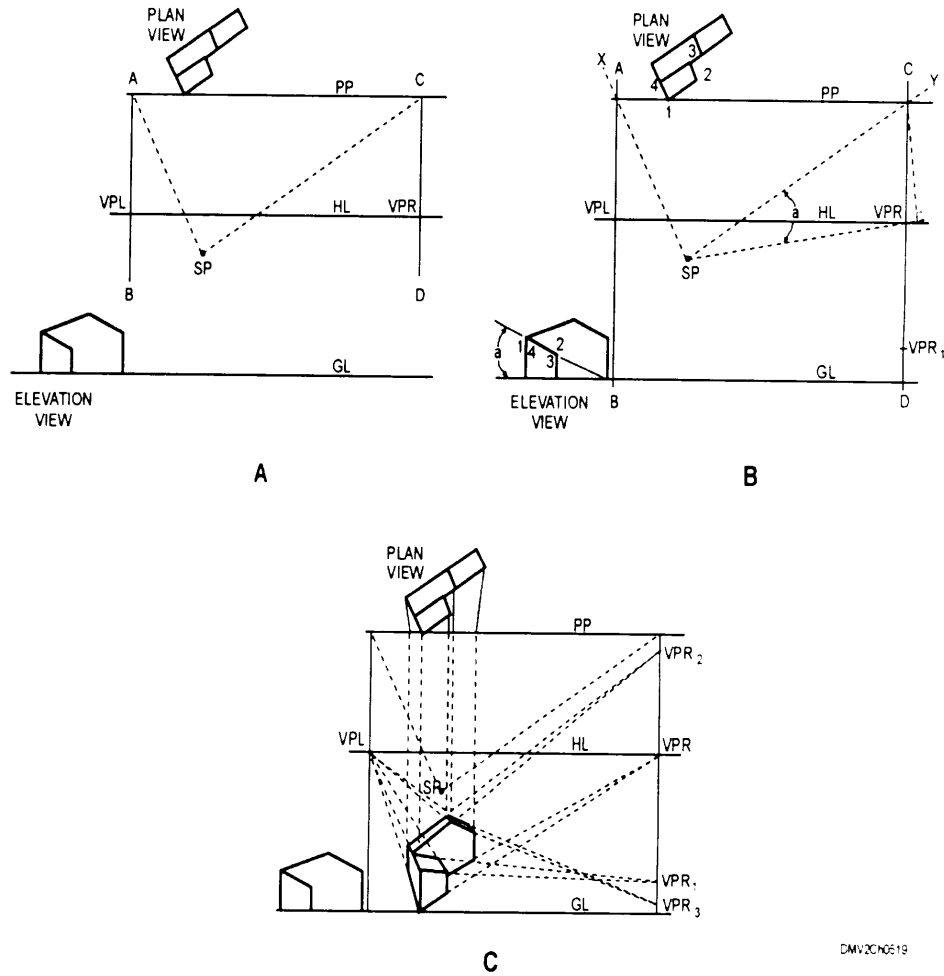


Figure 5-19.—Drawing inclined lines and planes in two-point perspective.

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Perspective Practices, Continued

Curves and circles in perspective

Curves and circles in perspective appear in true shape and size when the surface containing the curve or circle is parallel to the picture plane. Curves and circles on surfaces not parallel to the picture plane appear as ellipses. Ellipses have no direct transferable measurement; therefore you must place the circle within a square. By inscribing the circle within a square, the vanishing points and proportions of the curves are easily determined.

To lay out a circle in one-point perspective, use this table:

Step	Action
1	Draw a circle with the dimensions desired (figure 5-20, view A).
2	Draw a square circumscribing the circle. Construct center lines and diagonals inside the square. The intersections of the circle, the center lines, and the diagonals give you eight checkpoints for drawing the circle in perspective (figure 5-20, view B).
3	Draw the square in one-point perspective including the center lines and diagonals (figure 5-20, view C).
4	Draw in the circle through the eight checkpoints (figure 5-20, view D).

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Perspective Practices, Continued

Curves and circles in perspective (Continued)

Figure 5-20 shows the layout of a circle in one-point perspective.

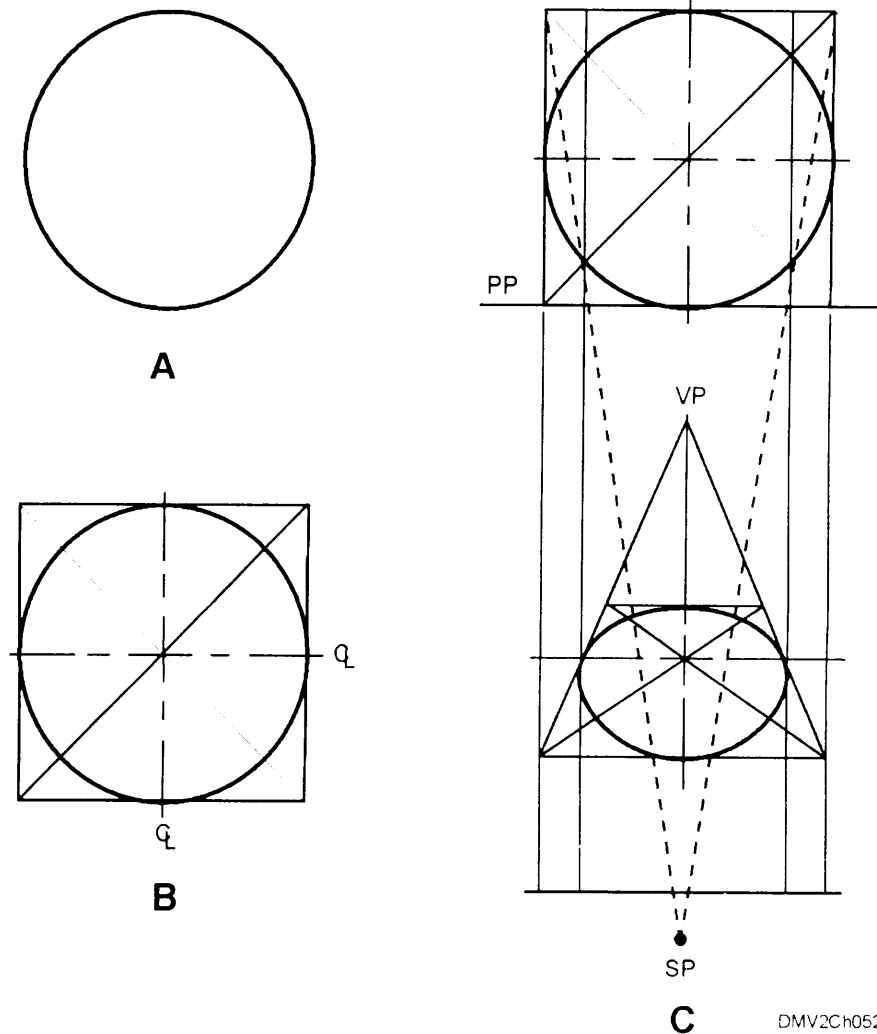


Figure 5-20.—The layout of a circle in one-point perspective.

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Perspective Practices, Continued

Curves and circles in perspective (Continued)

Drawing curves and circles in two-point perspective is similar to drawing in one-point perspective except for the additional vanishing point.

Figure 5-21 shows the circle in two-point perspective.

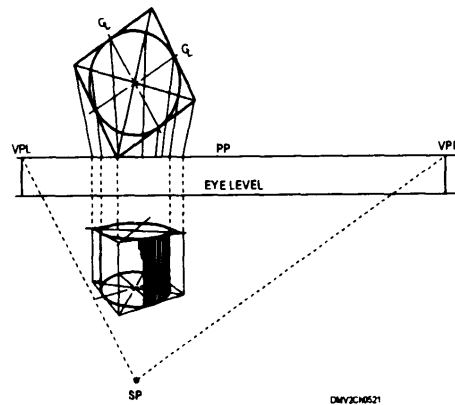


Figure 5-21.—The circle in two-point perspective.

Dividing lines or receding area into parts in perspective

Sometimes you need to divide a line or area into a number of parts. The key to most division of space problems in perspective is the vertical or horizontal line parallel to the picture plane.

To divide a receding plane into equal areas, use this table:

Step	Action
1	Divide the left vertical (AO) into equal parts with a ruler or scale.
2	From these points, draw lines to the vanishing point (figure 5-21, view A).
3	Draw a diagonal from point A to point B (figure 5-21, view B).
4	Where the diagonal and receding lines intersect, draw vertical lines. This divides the receding plane into equal units.

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Perspective Practices, Continued

**Dividing lines
or receding
area into parts
in perspective
(Continued)**

Figure 5-22 illustrates dividing a receding plane or surface.

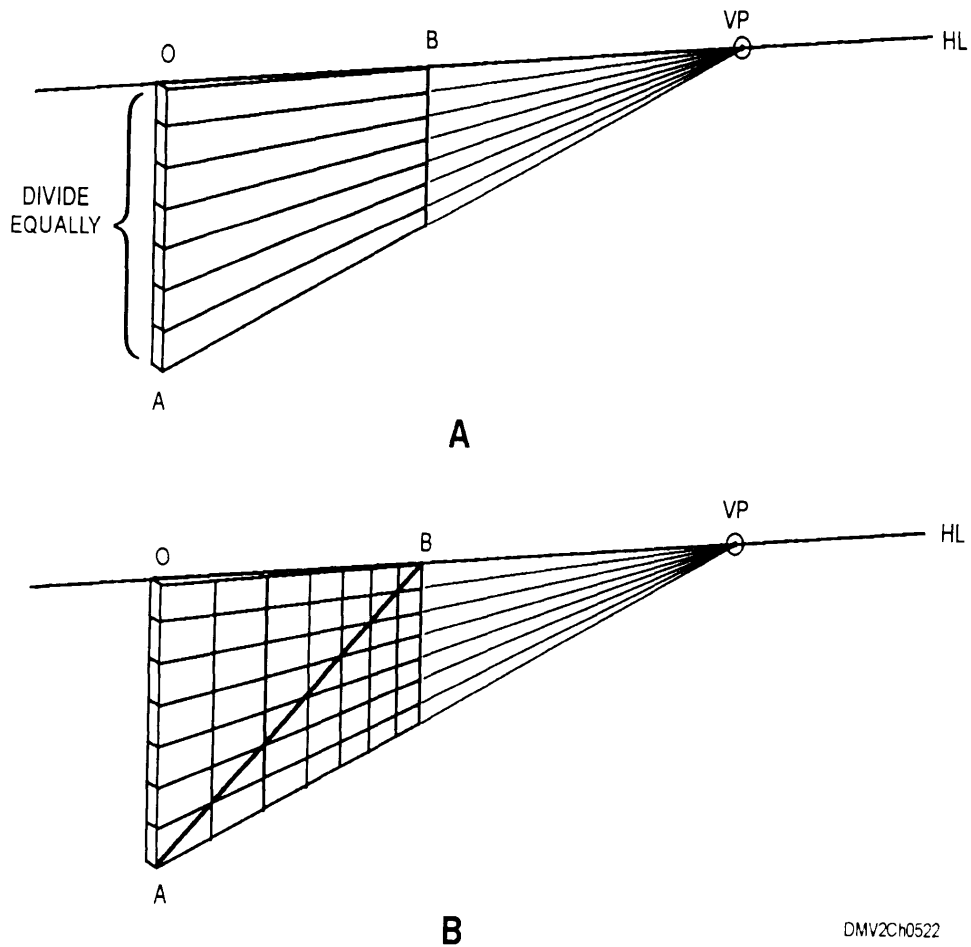


Figure 5-22.—Dividing a receding plane or surface into equal parts.

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Perspective Practices, Continued

Dividing lines or receding area into parts in perspective (Continued)

When the problem involves finding equal division points of a plane in perspective and the placement of these points is known, the problem can be solved as shown in figure 5-23. Since the points are parallel on the object, they have the same vanishing point.

To find incrementally placed horizontal points in perspective, use this table:

Step	Action
1	Locate a horizon line, ground line, and station point.
2	Place a vanishing point and draw a visual ray from the SP to the VP.
3	At the intersection of A and GL, measure and center the width of the first horizontal element.
4	Draw lines from each end of the first horizontal element to the VP.
5	Measure incrementally spaced horizontal elements along A to the intersection of HL.
6	Darken the outlines.

Figure 5-23 shows equally spaced horizontal points.

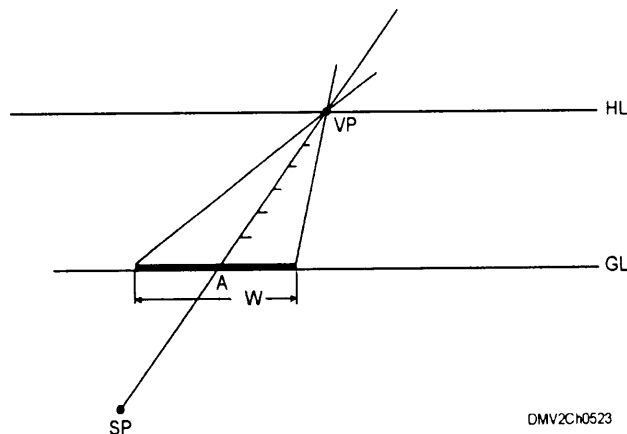


Figure 5-23.—Projecting horizontal points.

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Perspective Practices, Continued

Dividing lines or receding areas into parts in perspective (Continued)

When drawing vertical divisions in perspective, use this table and refer to figure 5-24.

Step	Action
1	Construct the first two points with the desired space in between them (A and B).
2	Locate a vanishing point (VP) and draw lines C and D from the original two objects. No part of the objects should extend above or below the receding lines.
3	Mark the center of the first post and draw a line (E to VP).
4	From the top of the first post, draw a diagonal line through the center of the second post. The third post will be located where the diagonal line intersects the line representing the receding group line (D to VP).
5	Repeat this procedure locating any number of members desired, drawing one at a time.

Figure 5-24 illustrates drawing vertical divisions in space.

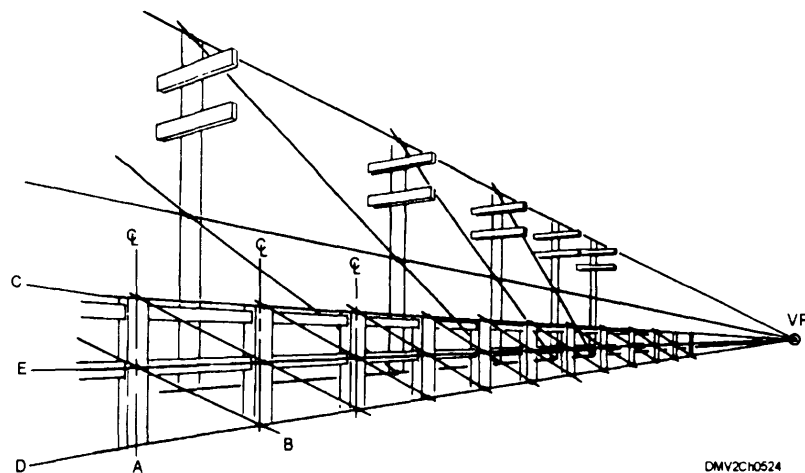


Figure 5-24.—Drawing vertical divisions in perspective.

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Perspective Practices, Continued

Reflections, shadows, and shade in perspective

Realistic perspective drawings drawn either mechanically or by freehand may require the use of reflections, shadows, or shading.

REFLECTIONS: Reflections occur when you view an object on or near glossy or shiny surfaces such as glass, polished metals, or water. Reflections appear not as a scene in reverse, but as though you were below the scene looking up. When drawing reflections, the station point and the horizon line are the same as the ones used to initially draw the object. Horizontal widths remain the same and project downward defining the width of the reflection. Vertical height is the only dimension left to calculate. To define heights in a reflection, revolve the object to reflect below a surface as far as it projects above it. When the object is close to the horizon, the reflection is nearly a duplicate of the original scene. When an object is set back from the horizon line, the scene appears abbreviated.

Figure 5-25 illustrates how the horizon line, station point, and vanishing points are the same for the object and the object in reflection.

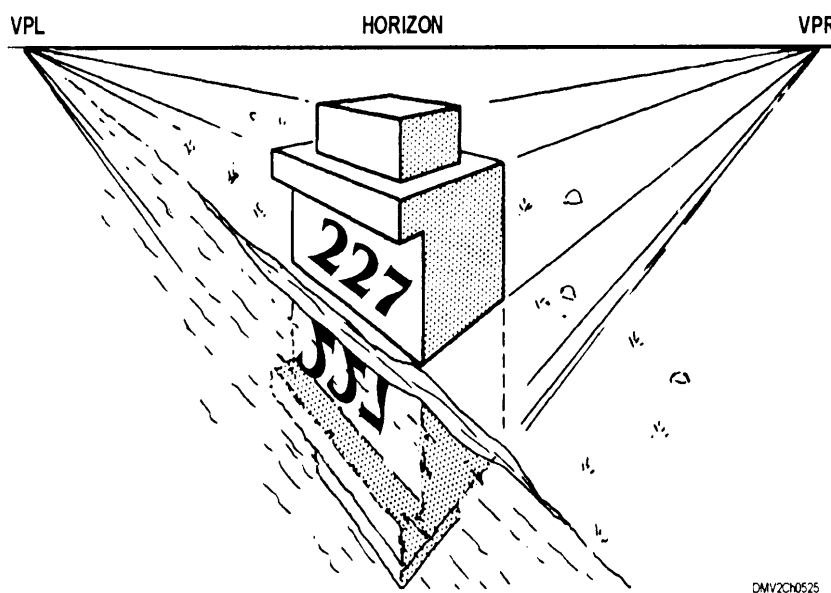


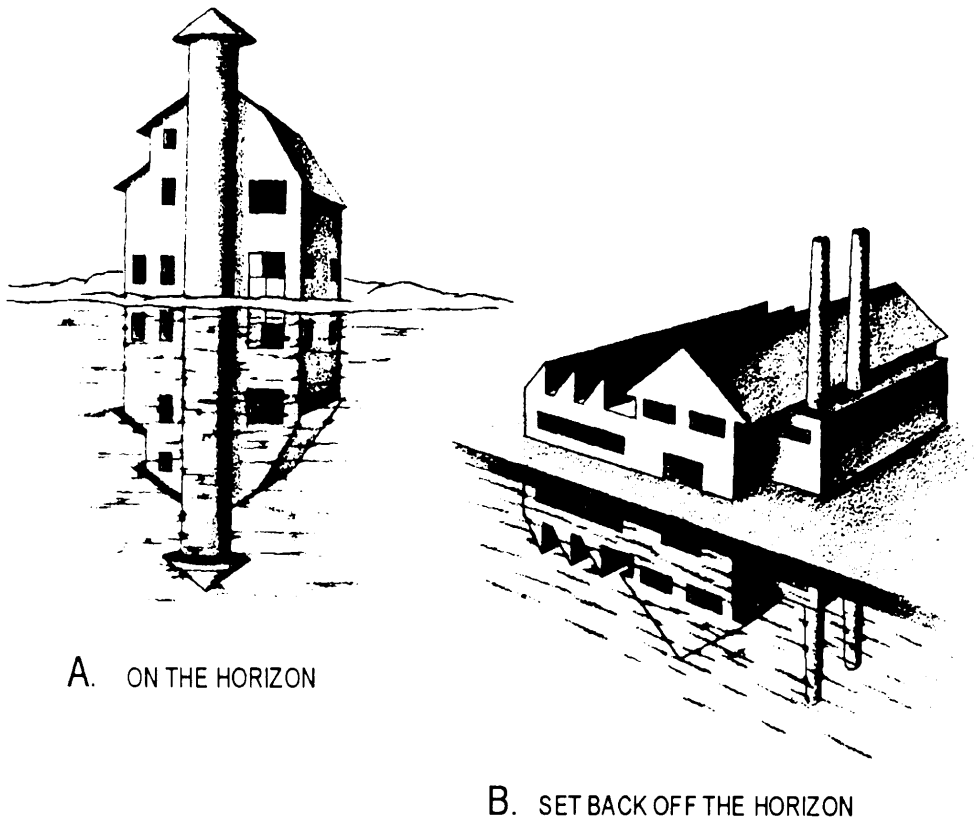
Figure 5-25.—Reflections in perspective.

Continued on next page

Perspective Practices, Continued

Reflections, shadows, and shade in perspective (Continued)

Figure 5-26 shows the affect on reflections of changing the objects position to the horizon line.



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Figure 5-26.—Affects on reflections when objects are placed: A. On the horizon, and B. Set back off the horizon.

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Perspective Practices, Continued

Reflections shadows, and shade in perspective

SHADOW: Shadows in perspective necessitate your determining the position of a light source and a vanishing point for the shadow. Establish a light source either on or off your drawing paper. This is a simulated position and direction that indicates the location of a real light such as the sun or a light bulb. Locate a vanishing point for the shadow vertically below the light source on the horizon. Draw visual rays from the simulated light source to the corners of the object. Extend the rays to the plane on which the object rests. Draw lines from the vanishing point of the shadow to intersect the visual rays from the light source along the ground line. The shadows will follow the contour of the plane or object on which they fall.

Figure 5-27 shows the location of a light source, shadow vanishing point, and shadows in perspective.

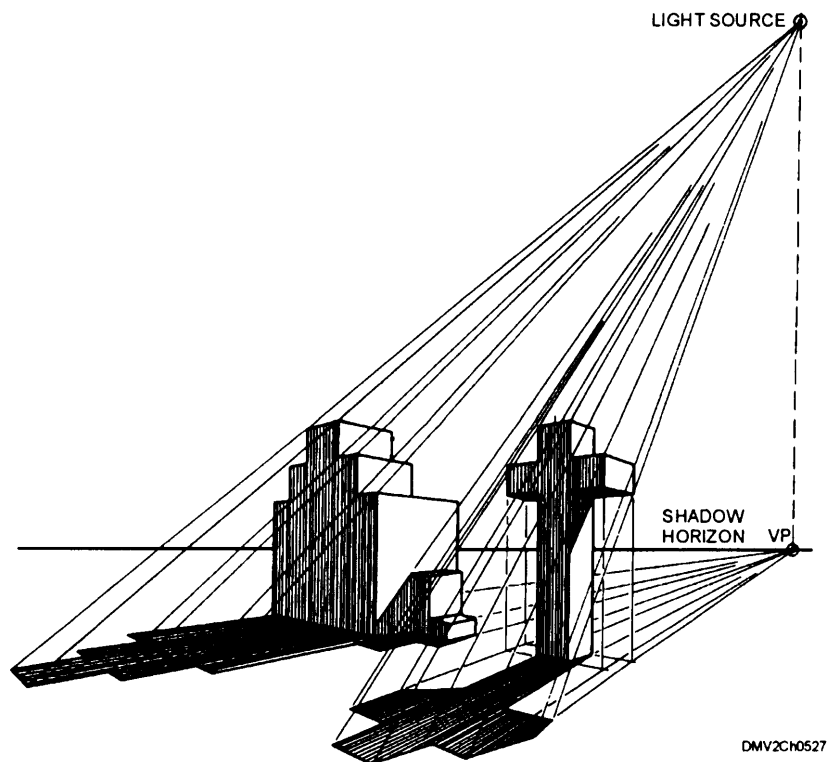


Figure 5-27.—Shadows in perspective.

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Perspective Practices, Continued

Reflections, shadows, and shading on perspective (Continued)

SHADING: Without shading perspective drawings fail to believably portray reality. Shading finishes and embellishes drawings. Shading helps to describe object outlines and simulate tactile surfaces. Shading on technical drawings should be kept simple and limited to clarifying an object or a picture. When done correctly, shading improves the presentation of display drawings, patent drawings, and industrial pictorial drawings. Working drawings are ordinarily not shaded.

Figure 5-28 shows various shadings on different objects.

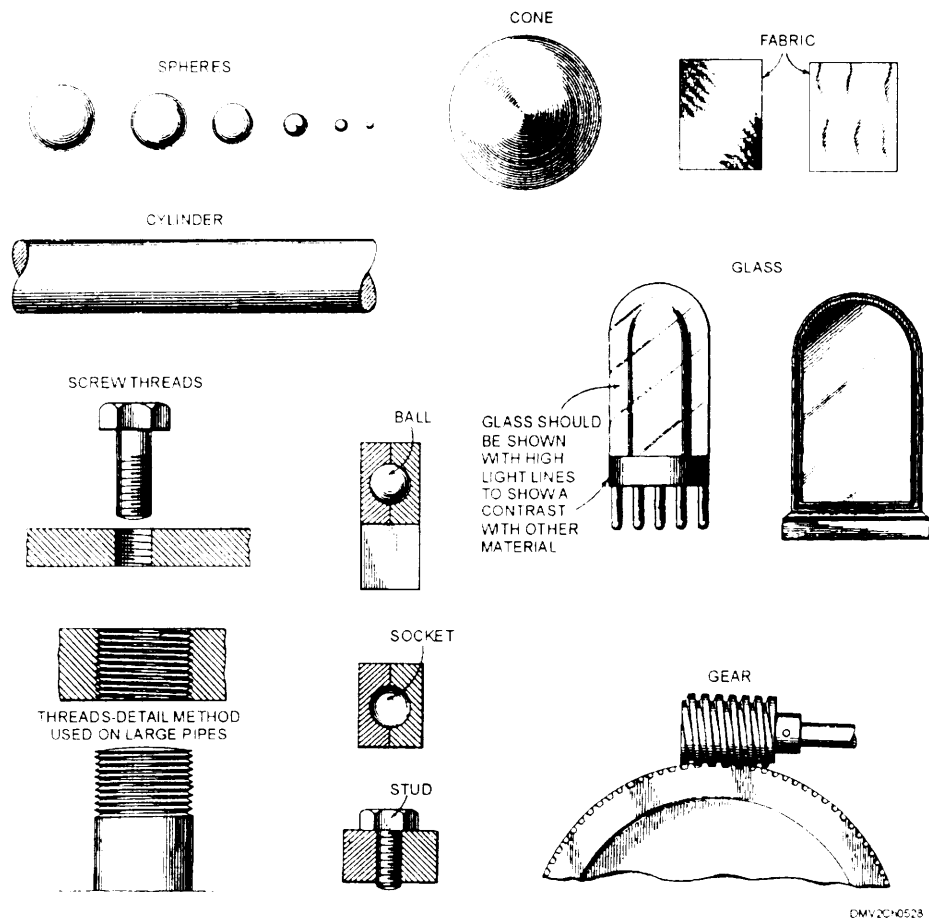


Figure 5-28.—Examples of how shading finishes a drawing.

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Summary, Continued

Review

This chapter covers the theory of perspective projections, the interrelationship of linear and aerial perspective, and the opposing principle of reverse perspective. Definitions of one-, two-, and three-point perspective should enable you to create perspective drawings. The procedures for mechanical construction of perspective drawings using the plan-view method are discussed as well as a brief description of line measurement. The section on general practices in constructing perspective drawings should simplify your task of creating realistic perspective drawings of any object in front of you.

Comments

Perspective is not the easiest part of the DM rating to learn. Perspective is the most telling feature of a drawing when assessing the talents of a DM. Each one of us has seen drawings that superficially appear well constructed. On closer inspection, certain details make us aware that the DM was not as talented as was first thought. The most tattle-tell element in a perspective drawing is the way a circle on a plane not parallel to the plane of projection is drawn. Pay close attention to the angle of the major to minor axis of an ellipse representing a circle in perspective. Strive to get the details right.

Perspective projections are often confused with parallel projections covered in the next chapter. Take the time to truly understand the material in this chapter before moving on to the next chapter.
